This was cleared out and the divided muscle united with stout catgut applied as mattress sutures. The patient made an uninterrupted recovery. She was advised not to do acrobatics for at least three months.

Leeds. P. J. MOIR, M.B., F.R.C.S.

RUPTURE OF THE RECTUS ABDOMINIS MUSCLE SIMULATING APPENDICITIS.

RUPTURE of the rectus abdominis muscle by indirect violence appears to be a condition of relatively rare occurrence, and is not mentioned in any of the standard textbooks as a lesion to be considered in the differential diagnosis of appendicitis.

A woman, aged 48, was admitted to Northampton General Hospital on February 8th, 1927. Six weeks previously, while stretching up to take a jar from a shelf, she felt a sharp pain in the right iliac region. The pain was present for three days, but there were no other symptoms, and she was able to do her housework. One week before admission, while walking about the house, she again felt the pain and went to bed. The pain became a constant ache with occasional sharp twinges, located at first in the suprapubic region and later in the right iliac fossa. During the week she also complained of loss of appetite and was feverish at night, sweating frequently. She had no cough, nausea, or vomiting, but was constipated.

On admission the temperature was 99.8°, and the pulse 96. The abdomen presented slight resistance in the lower half of the right rectus muscle and slight deep tenderness, with its maximum one inch above and internal to McBurney's point. No tumour was palpable. The heart and chest were normal. A diagnosis of subacute appendicitis was made, and the abdomen opened by a right paramedial incision. The rectus sheath was blood-stained, and on opening it the middle third of the muscle was found to be ruptured about 1½ inches below the umbilicus. Between the fragments was a blood clot which appeared to be partially organized. The muscle itself was dark red. On opening the peritoneum the appendix was found to be normal in every way. The ends of the ruptured muscle were approximated and the wound closed. Apart from the extrusion of a catgut suture the patient made an uneventful recovery and was discharged with a firm scar in sixteen days.

Of twenty-five recorded cases of rupture of the rectus abdominis muscle twenty-three occurred during influenza, one in pneumonia, one from coughing, cause not stated, and one from an effort in jumping.[1] The presence of muscular lesions in influenza and of a special predilection for the rectus abdominis, resulting in some cases in rupture, was made clear by Abrahams, Hallows, and French in 1919.[2] They described the muscle as haemorrhagic and pulpy, and thus distinct from the pallid appearance seen in other acute fevers such as typhoid. The lesions occurred chiefly in the very severe cases of influenza.

Where there is a definite infective lesion the occurrence of muscle rupture from slight degrees of violence is easy to explain, but in the case here recorded the rupture presumably took place six weeks before admission and at a time when the patient was in good health. The recurrence of symptoms five weeks later is difficult to explain, as she can give no history of a second strain.

I am indebted to Mr. Holman, F.R.C.S., for permission to publish this case.

Northampton. C. R. MCCASH, M.B., Ch.B.

PULMONARY EMBOLISM FOLLOWING CHILDBIRTH—RECOVERY.

IT may be of interest to add the following report of a case of pulmonary embolism to those recently published in the JOURNAL.

A primipara, aged 33, was delivered of a boy weighing 8 lb. in May, 1926; labour was somewhat lengthy, but not unduly so considering her age; otherwise it was normal in every way.

I was present at the birth, and her general condition was excellent. I was sent for three days later and found her very cyanosed, with a small pulse of 160, the temperature 100.5°, respirations 45. She told me that she had been quite well until an hour or so previously, when she felt a sudden severe pain in the left side of the chest, with difficulty in breathing. It was an effort for her to talk, and she was coughing up frothy blood-stained sputum.

The only physical sign I could find was a small area of dullness in the left upper lobe; everything else was normal.

Oxygen was given through a closely fitting mask, and on two occasions a quarter of a grain of morphine hypodermically for the pain. She was very ill for fourteen days; she then gradually recovered, and was up within four weeks. She is expecting her second child in June.

Yalding, Kent. MARTIN HALLAM.

[1] Hartman, H.: *Presse Méd.* 1917, 25, 241.
[2] Abrahams, Hallows, and French: *Lancet*, 1919, i, 1.

Reports of Societies.

EXPERIMENTAL ENDOMETRIAL GRAFTS.

AT a meeting of the North of England Obstetrical and Gynaecological Society on April 1st, at the Medical Institution, Liverpool, with the President, Professor FLETCHER SHAW, in the chair, Dr. J. W. A. HUNTER read a paper entitled "Some observations on experimental endometrial grafts."

Dr. Hunter said that though workers appeared to be satisfied when they had demonstrated the possibility of heterotopic endometrial growth, yet no one had as yet reproduced in animals a condition comparable with tarry ovarian cysts in women. In his research he had used some forty rabbits; the transplants were mostly autogenous, but a few were heterogeneous. The general reaction obtained was the growth of a multilocular cyst lined by columnar epithelium which was non-infiltrating; stromal proliferation only occurred in the papillary buds. From rabbits killed on the third and tenth days respectively after grafting two methods of cyst formation were found. The epithelium dipped down into the graft to form a cyst, or it covered the graft and lined the undersurface of the layer of fibrin which sealed in the graft. It was also noticeable in these experiments that while the columnar epithelium was scanty in the depths of the graft, it always covered the outer surface and grew along the lines of tissue junction. The stroma in the early stages was engorged. In order to test the effect of vascularity of the site of grafting, some transplants were placed in the liver and some in an avascular part of the abdominal wall in the same rabbit. The former showed considerable proliferation of endometrium with preservation of the racemose gland arrangement but surrounded by a definite capsule, whilst the latter showed a scanty growth of epithelium of a low activity. Even after 290 days a very active growth was found in the liver, whereas it was not so exuberant in the ovary. In another animal, after 388 days the general reaction was obvious, and after 760 days very small cystadenomata were found in atrophic ovaries. As a test of the influence of ovarian hormone grafts were introduced into the ovaries, and both the ovaries, containing corpora lutea, from another animal were transplanted into the abdominal wall. Fifty-four days later very large cystadenomata were found with adhesions to many adjacent organs; these showed large thin-walled cysts without invasion of surrounding structures. This result could only be obtained when the grafted ovaries from another animal contained corpora lutea. In an experiment in which the grafts were placed in the abdominal cavity of a male rabbit it was found thirty days later that there was no trace of the columnar epithelium, but the gland spaces remained. An attempt to confirm the "serosal" theory by the implantation of pieces of peritoneum and subperitoneal tissue produced a negative result, although there was an active growth of the mesothelial tissues. In one case in which grafts were placed in the ovary and the ovary was then transplanted into the abdominal wall definite endometriosis with invasion was produced. Dr. Hunter concluded from this series of observations that fragments of endometrium when grafted into any organ could grow. He considered that the factors which controlled growth of the stroma and endometrium were not the same, and that there was a selective action of the hormone of the corpus luteum controlling endometrial growth, more especially its epithelial portion. The experiments showed that whereas implanted endometrium could continue to grow for an almost unlimited time, it did not, in normal circumstances, become invasive. In the one instance in which there was an abnormal factor present (transplantation of the ovary which was the site of the graft) the typical picture of endometriosis was obtained. This rather led to the view that for the production of the human picture, one factor, either the endometrium or the invaded tissue, must be abnormal.

Dr. S. B. HERD asked whether the time in the oestral cycle at which the endometrium was taken for grafting made any difference to its capacity for growth.

Professor BLAIR BELL commended Dr. Hunter's research, and said that such investigations would advance knowledge of an interesting subject. He showed a specimen which indicated that it was possible experimentally to secure, not only an endometrial tumour by implantation, but also, during pregnancy at any rate, to produce a "shower" of glandular implants almost entirely over the whole peritoneal surface of the abdominal cavity.

The PRESIDENT emphasized the importance of comparing results obtained by experimental methods of this kind with clinical experience.

Dr. HUNTER, replying, stated that in his experience the time in the oestral cycle at which material was obtained for grafting made no difference to its capacity for growth.

Unusual Congenital Abnormalities.

Professor D. DOUGAL reported a case of unusual malformation of the broad ligament. He said that a married nullipara, aged 45, had complained of a blood-stained discharge of twelve months' duration; a severe haemorrhage had occurred two months before she was seen. On examination the uterus was found enlarged. The cervix was much thickened, very hard, and stretched, and there was a good deal of bleeding on examination. On opening the abdomen it was found that the uterus contained a number of fibroids, including one in the cervical canal. The main interest, however, lay in the malformation of the left appendage. The left ovary lay with its inner pole close to the internal abdominal ring, and running from it into the inguinal canal was a thick muscular cord, about one-eighth of an inch of this being visible between the ovary and the ring. The ovary was normal in appearance. The left Fallopian tube was somewhat small and terminated on the outer side of the ovary more than two inches from the uterus; the fimbriated end was fully developed. The kidney and ureter were completely absent on this side. Running from the ovary towards the uterus was a fold of peritoneum in the outer part of which could be made out a fibro-muscular structure, which tapered to a point and terminated about one inch from the uterus. The peritoneal fold joined the uterus about the junction of the body and cervix. The right ovary and tube were apparently normal, and were attached to the uterus at a much higher level than the peritoneal fold on the opposite side. The uterus itself was much distorted by the presence of fibroids, but Professor Dougal thought it might be assumed to be of the unicornuate type, the left horn being completely absent. The upper part of the left Müllerian duct formed the Fallopian tube, and there the further development of this structure had ceased. The Wolffian structures on this side were evidently absent. The position of the ovary at the internal abdominal ring was interesting, as the fibro-muscular cord attaching it to the ring presumably represented the ovarian and round ligaments. As the Müllerian duct on this side had not grown inwards to fuse with its fellow of the opposite side, the gubernaculum had drawn the ovary straight downwards to the inguinal ring. The malformation was undoubtedly rare, and he had only been able to find a record of one somewhat similar case, which was reported by Bonnaire and Durante in 1912.

Professor Dougal described also a case of unilateral duplication of the ureter with one ectopic opening. The patient, aged 24, unmarried, had complained of deficient control over micturition, which had been present practically since birth. She was able to pass urine in the ordinary way, but in addition was wet both night and day. She always wore a diaper and used three in the twenty-four hours—one during the night and two during the day. The leakage was noticeably worse in cold weather. She was well developed and highly educated, and was acutely conscious of her disability. On inspecting the vulva carefully Professor Dougal thought that he could observe urine welling up from the vagina. He therefore decided that the condition was more than a mere weakness of the sphincteric control of the bladder, and admitted her to a nursing home for further investigation under anaesthesia. During this examination he found that the urine escaped periodically from a small opening in the vestibule just below the urethral opening, and a little to the right of the middle line. It was a simple matter to demonstrate that the urine coming from this opening did not pass through the bladder, and it was therefore evident that the condition was one of ectopic ureteral opening. Mr. Wilson Hey found that there were two ureteral openings normally situated in the bladder, and that both were acting normally. In addition there was a second ureter on the right side, and this one had an ectopic opening on the vestibule. Sodium bromide was injected into the right ureter on the left side, but only a small quantity could be passed in and there appeared to be some partial obstruction in the upper part. This salt was also injected into the ectopic opening of the right ureter, and passed freely up to the kidney pelvis. Professor Dougal said that there were evidently two pelves and two ureters on the right side; one of these ureters had an ectopic opening from the vestibule. The lower part of the ectopic ureter was sacculated, as was well seen in the radiogram. This abnormality was obviously important clinically, but it was also interesting from an embryological point of view, as the ectopic ureteral opening in this case was situated at the point where Gärtner's duct was usually supposed to terminate.

Professor BLAIR BELL called attention to the fact that true uterus unicornis was very rare. Most cases so described had been, in reality, cases of uterus bicornis in which one horn was poorly developed. Two other points of interest were demonstrable in Professor Dougal's specimen. The ovarian ligament on the side on which the uterine horn was not developed ran straight to the inguinal ring, indicating the truth of views emphasized by the speaker many years previously, that the round ligament and the ovarian ligament were one structure, and together represented the gubernaculum. The second point of interest was that, although the Fallopian tube as a whole was not formed, the fimbriated extremity was present—a matter of common observation in many cases of malformation of the parts, and one which bore out Keith's contention of the origin of the fimbriated extremity from the pronephros.

Clinical Demonstrations.

Professor BLAIR BELL described a specimen and sections of carcinoma of the cervix with pregnancy. The patient was a 12-para, aged 36, and was twenty-two weeks pregnant when seen. Panhysterectomy with bilateral salpingo-oöphorectomy and appendicectomy was performed, and recovery was uneventful. Subsequently she was treated by injections of lead colloid. Professor Blair Bell said that cancer of the cervix associated with pregnancy was decidedly rare, occurring on an average once in about every 10,000 cases of pregnancy.

He then showed a case of primary adenocarcinoma of the Fallopian tubes in a primipara, aged 45. She had complained of pain in the back and hypogastrium, and a yellow inoffensive discharge for twelve months; there was frequency of micturition, and the patient became exhausted on the slightest exertion. The uterus was thought to be enlarged, irregular and immobile. A large swelling was felt through the anterior fornix, evidently pressing on the bladder. A hard mass was felt on either side of the uterus. Panhysterectomy with bilateral salpingo-oöphorectomy was performed, but was extremely difficult, owing to the density of the adhesions and the presence of bilateral ovarian cysts, which appeared to burrow deeply in the loose tissues of the pelvis. Subsequently a small vesico-vaginal fistula was found and easily repaired. Professor Blair Bell said that primary carcinoma of the Fallopian tube was rare, less than 150 cases being reported in the literature. It was probable that the condition occurred with greater frequency but that the cases were not recorded. He had had three cases, but the other two had not previously been reported, although a section from one of these was illustrated in the last edition of his *Principles of Gynaecology*.

He also showed three cases of Krukenberg tumour, one associated with pregnancy. The first patient was a nulliparous married woman, aged 35, who complained of a bearing-down pain in the hypogastrium, with frequency of micturition almost amounting to incontinence. On examination a large tumour, mostly in the right iliac fossa but extending in the hypogastrium to the umbilicus, was felt.

The cervix was immobile, and the uterus could not be separated from the tumour. Following operation the patient died from heart failure. The second patient, a 7-para, aged 42, complained of vomiting for eighteen months, and pain in the epigastrium relieved by the vomiting. She also had obstinate constipation, loss of weight, weakness, and haemorrhoids. On examination the tumour was discovered in the epigastrium, and was thought to involve the liver. There was dullness in the flanks and free fluid in the abdomen. At laparotomy a primary carcinoma of the pylorus was discovered adherent to the liver, in which there were secondary nodules. There were nodules on the peritoneum. The right ovary was the size of a large coco-nut; the left ovary was smaller. Subtotal hysterectomy with bilateral salpingo-oöphorectomy was performed. Thereafter she had a course of six injections of lead colloid, but death occurred at the end of eight and a half months. The third patient, a 5-para, aged 32, complained of diarrhoea for two years and a painless lump in the right iliac fossa, which had gradually increased in size for four months. Just before she was seen she had had a severe pain in the right side, accompanied by vomiting and diarrhoea. There had been loss of weight. On examination the uterus was found to be about four months pregnant, and there was a solid tumour to the right of it, which extended into the pouch of Douglas. The uterus itself was mobile. Supravaginal hysterectomy with double salpingo-oöphorectomy was performed. The right ovary was enlarged to the size of a foetal head, and was adherent to the rectum. The left ovary did not appear to be affected. A cicatricial area at the pyloric end of the stomach was detected. Subsequently x rays showed malignant disease at the pylorus. The patient commenced a course of lead injections, but was lost sight of later. Professor Blair Bell said that these tumours, originally described by Krukenberg as primary sarcoma carcinomatodes of the ovary, were now invariably regarded as secondary to gastric, or possibly intestinal, carcinoma.

Dr. BURNS mentioned a case of carcinoma of the cervix complicating a sixteen weeks' pregnancy for which he performed Wertheim's pelvic dissection, and later applied radium to an early recurrence in the vaginal vault with a satisfactory result. Miss IVENS said that she did not consider primary carcinoma of the Fallopian tube as a very malignant condition, and quoted two cases of her own in support of this view. Dr. W. W. KING asked how long the patients with Krukenberg's tumour had lived after operation, as from his experience of three cases the average time was only about three months. Professor BLAIR BELL, in reply, said that he considered primary carcinoma of the Fallopian tube on a par as regards malignancy with adenocarcinoma of the body of the uterus; for a long time the disease remained enclosed within the tube. While this was so, extension or metastasis was rare, but once the tube wall was penetrated extension was rapid. As the Krukenberg tumours were always secondary to disease elsewhere, removal of them alone, without further treatment, must be followed in a few months by the death of the patient.

Mrs. DOBBIN CRAWFORD reported a case of double vaginal cyst arising from Gärtner's duct. The patient, a multipara, aged 52, suffered discomfort and pain from a swelling in the vulva caused by one of two vaginal cysts. This was the size of a golf ball and occupied the lower part of the right antero-lateral vaginal wall, ending at the vestibule about half an inch behind the urethra. The second cyst was above the first; it was smaller and oval, and passed up towards the right fornix. The cysts did not appear to communicate with each other. Each was readily shelled out from beneath the vaginal mucous membrane, but in the deeper layers was attached by dense fibrous tissue. The lining membrane was smooth throughout and there was no sign of infection. A section showed that the cyst was lined by epithelium which was cubical in most parts, but here and there a fold in the cyst wall was lined by columnar cells; these cells had possibly been protected by the fold from pressure and so had undergone no flattening. Outside the epithelium a layer of connective tissue was to be seen surrounded by muscle. Several cases on record of distension of Gärtner's duct were mentioned, in particular that reported by Amand Routh in 1894, in which a parovarian cyst was in communication with a vaginal cyst, which latter opened by a very small orifice at the base of the vestibule about half an inch behind and to the right of the urethra, quite distinct from Skene's tubules.

Professor ERNEST GLYNN described a case of idiopathic dilatation of the urinary bladder in a woman aged 48; trabeculae were well developed and a small sacculus was present. There was also a moderate amount of bilateral hydronephrosis. The uterus was normal. He had performed necropsies on two similar cases in men. He wondered how far such a condition might be produced by habit. On the other hand, he pointed out that idiopathic hypertrophy of the bladder with hydronephrosis was described in children. He himself had seen two cases *post mortem*, both males, aged 12 and 16 respectively. Dr. J. E. GEMMELL described two cases he had seen. No cause could be assigned for the first, but the second was certainly due to a "habit"; the patient, finding it very difficult to leave her work, had accustomed herself to going all day without emptying her bladder. Dr. W. W. KING also quoted two cases due to habit—the one in a cinema pianist, and the other in a chronic alcoholic who had prolonged periods of unconsciousness. Professor GLYNN, in reply, quoted a similar case in a policeman who was on point duty for long hours at a time.

FRACTURE OF THE PATELLA.

AT a meeting of the Section of Surgery of the Royal Academy of Medicine in Ireland on March 25th, Sir WILLIAM I. DE COURCY WHEELER in the chair, Mr. W. PEARSON showed a child, aged 10, on whom he had recently operated for fractured patella.

Mr. Pearson said that the child had climbed up on to a mangle and had fallen to the floor; she had not been able to get up. She was taken to hospital, and the knee-joint was found to be very distended, obviously with blood; owing to this distension it had been very difficult to make a diagnosis. A skiagram, however, showed that the patella had been fractured. Six days after admission Mr. Pearson had operated, and had found a typical transverse fracture of the patella. The operation had now been performed three months, and the child could run about quite well. Mr. Pearson said that this form of fracture of the patella was a very common injury in adult life, but it was believed to be an injury which never occurred in children, and practically never in adolescence. He thought it probable that the reason for the rarity of the injury in children was the fact that the knee extensor was very elastic at that age.

Sir WILLIAM WHEELER said that there was very little in the literature about fractures of the patella in children; but it was stated that they were unknown before the age of 10, were very rare up to the age of 20, and were almost confined to later life.

Mr. A. CHANCE referred to the good mobility of the knee obtained in Mr. Pearson's case. He added that it was essential to get back the full range of flexion, for anything short of full range involved a recurrence of patellar strain with possible repetition of the fracture.

Mr. PEARSON, replying, agreed with Mr. Chance that a fracture of the patella might recur; he proposed to keep his patient under observation until he had obtained full range of flexion. He thought that fracture of one patella predisposed to fracture of the other.

Psoas Abscess due to Tuberculous Kidney.

Mr. SETON PRINGLE showed a specimen of a tuberculous kidney associated with the formation of a psoas abscess.

A woman, aged 32, was admitted to hospital complaining of a large swelling in the right side of the abdomen which had grown slowly and without pain, and of a second swelling in the upper inner aspect of the right thigh. On examination the clinical features of a typical psoas abscess presented, but, in addition, a hard nodular tumour could be felt in the right hypochondrium, immediately underneath the anterior abdominal wall. This tumour gave the impression of being a pathological kidney, displaced forwards by the development of the abscess. No evidence of disease could be detected in the spine, which was perfectly flexible. The urine on examination was quite normal, and the cystoscope revealed a normal left ureter and a normal bladder, except for very slight scarring at the site of the right ureteric opening. The opening itself could not be identified after prolonged

search, and certainly was not functioning. There was no evidence of any inflammatory process in the neighbourhood. An *x*-ray examination of the right renal region and spine was negative. The psoas abscess was aspirated in the upper part of the thigh and 32 ounces evacuated. The right renal region was explored through an antero-lateral oblique incision, and the kidney, which had been completely infiltrated by tuberculosis, was removed. In doing this the abscess cavity was opened and a communication between it and a caseous cavity in the substance of the kidney was easily established.

Sir WILLIAM WHEELER said that this was a very rare specimen. He had never heard of a psoas abscess which was directly due to a tuberculous kidney, as in this case. Mr. DENIS KENNEDY thought that the ureter became affected first, and the disease developed behind it. Mr. C. J. MACAULEY regarded this case as being analogous to cases in which a large gland was found in the neck, with a caseous abscess at the bottom of it. He suggested that the absence of previous bladder symptoms could be accounted for by the early closure of the ureter.

JAMES MACKENZIE INSTITUTE.

Acidosis.

THE concluding lecture of the spring course at the James Mackenzie Institute for Clinical Research, St. Andrews, was delivered by Dr. G. MATTHEW FYFE, his subject being laboratory observations on acidosis. After remarking on how little was really known regarding the biochemistry of acidosis, largely on account of the complicated changes which occur, the lecturer pointed out that even in the most intense manifestations of the disease the reaction of the blood remained practically constant. The mechanism by which this constancy was maintained was an intricate one depending upon two essential processes—the presence of buffer substances and the excretion of acid bodies—interference with which resulted in the appearance of the syndrome clinically termed acidosis. The actions of the bicarbonates and the phosphates, which together constituted what was termed the alkaline reserve of the blood (a sustained diminution of which gave rise to the symptoms of acidosis), were described, and the significance in the laboratory diagnosis of acidosis, of observations on the amount of bicarbonate and CO_2 in the blood and of CO_2 in alveolar air, was emphasized, as was the information sometimes derived from comparative estimations of the reactions of the blood and of the urine. Little information could be derived from the buffer effect of amphoteric proteins in acidosis. Regarding the cells of the body two similar neutrality regulating processes were described—that of the "chloride shift" and that of the alterations which occur in the strength of haemoglobin as an acid. Their mechanism, however, could not be estimated in exact terms, but nevertheless it was thought that the cells along with proteins constituted a line of defence second to that of the alkaline reserve. There was described an accessory mechanism, controlled by the kidneys, wherein a considerable amount of ammonia derived from the faulty deaminization of proteins was used to neutralize abnormal acids, so as to prevent loss of the fixed alkalis of the blood and tissues. The criteria of acidosis then would be: (1) Excretion of acid urine; (2) decrease in the bicarbonates of the blood, with consequent decrease of its CO_2 combining power; (3) decrease in the CO_2 tension of alveolar air; (4) alteration in the ammonia coefficient of urine; (5) excretion of ketone bodies.

An opportunity was taken at this point to define acidosis and ketosis as different phenomena, the former being a perversion of physiological processes, the latter being a pathological process accompanied by acidosis. Acidosis was defined as an interference with the neutrality regulating processes of the body, with a consequent deficiency in its powers to deal with the acid substances produced in metabolism. The concluding part of the paper was concerned with laboratory methods of diagnosing acidosis, with methods of estimating the acidity of the urine, acid excretion by the kidney, sodium bicarbonate in plasma, CO_2 in alveolar air, ammonia and ketone bodies in urine were described. By the simple expedient, however, of administering sodium bicarbonate by mouth and of testing the reaction of the urine, the physician had at his command probably the most practicable test at present available.

Reviews.

THE THEORY OF PERCEPTION.

SIR J. H. PARSONS'S *Introduction to the Theory of Perception*[1] is one of the series of volumes forming the Cambridge Psychological Library. Psychology is largely studied by introspective and other methods which are not very amenable to strict scientific discipline, and the study of perception, which may be said to form a connecting link between consciousness and simpler nerve processes, brings it into touch with the biological relations of the organisms and affords a mode of approach that is open to direct observation and experiment.

The author introduces the subject by a statement in general terms of the nature, genesis, and mechanism of perception. This is followed in subsequent parts of the work by a more detailed discussion of the various aspects of the problem, more especially in connexion with vision, the author's own special study. The simplest example of the mechanism is to be found in the unicellular organisms; here no differentiation of sensory receptors exists, nor any differentiated paths for incoming and outgoing impulses. There are no co-ordinating centres, but the whole body reacts in the mass. Consciousness, if it exists at all, is a mere vague awareness, associated with a feeling of pleasantness or unpleasantness according to the nature of the stimulus; and the response is limited to a simple withdrawal or approach, depending on the biological requirements of the animal. To this fundamental form of sensibility the name protopathic has been applied, in accordance with Head's nomenclature; it is manifestly of great importance for the preservation of the individual in the lowest types, and its existence can be recognized, according to the author, even in the highest forms of sensibility. Mounting a step higher, definitely localized receptors of stimuli are met with and impulses are transmitted through localized paths, forming the reflex arcs with their central intercommunications. Notwithstanding the increased complexity involved in these changes, it is possible to conceive, at least theoretically, that the sensibility retains, in the main, its protopathic character.

The next stage discloses a marked advance depending on the diversity of the stimuli impinging on the organism. Receptors become differentiated, introducing different modalities of sensation, such as vision and audition, and the impulses received in consciousness cease to be homogeneous. It is at this stage, apparently, that perception arises, the term denoting consciousness, with discrimination added to the mere feeling of pleasantness and unpleasantness. There arises a consciousness that certain groups or patterns of impulses among the aggregate of impulses received have a special biological significance, and these perceptual patterns, stereotyped by habit, become prepotent over concomitant impulses. Sensibility, therefore, in this stage, while still retaining a latent protopathic character, acquires discriminating or, as is said, epicritic features, and the mechanism becomes dual. A further important modification arises from the predominance of one or more of the sensory modalities; in some animals the sense of smell, in others that of sight, and these differences have a psychological bearing depending on the particular mode of life of the animal. The relatively complex mechanism described forms the basis of instinct; in its purest form the consciousness of perceptual patterns is held to act by inducing some definite emotional tone, and this exerts an influence on the motor response which is normal to the given stimulus. A good example of instinctive response is seen in the first flight of birds. The mechanism is transmitted hereditarily, and on the receipt of the appropriate stimulus flight occurs without any preliminary tentative rehearsals or deduction from previous experience. A still higher type of epicritic sensibility has its anatomical basis in the association-tracts of the cortex, which also subserve what the author, introducing a new term, calls the syncritic integration of perceptual patterns, such

[1] *An Introduction to the Theory of Perception.* By Sir John Herbert Parsons, C.B.E., D.Sc., F.R.C.S., F.R.S. Cambridge Psychological Library. London: Cambridge University Press. 1927. (Roy. 8vo, pp. viii + 254; 71 figures. 18s. net.)